Analox 1000 Series

User Manual

Analox Sensor Technology Ltd.
15 Ellerbeck Court, Stokesley Business Park
North Yorkshire, TS9 5PT, UK

T: +44 (0)1642 711400 **F:** +44 (0)1642 713900
W: www.analox.net **E:** info@analox.net

Contents

Package Contents Checklist 2

About the product 3

User Controls and I/O Connections 4

- User Controls 4
- I/O Connections 5
- Power supply 6

Battery Back-up 7

Alarm Setting and Operation 7

Calibration 8

- ZERO Adjustment 8
- SPAN Adjustment 8

Installation 10

Signal Inputs and Outputs 11

- Sensor connections 11
- Analogue Output 12
- Relay Outputs 12

Specifications 13

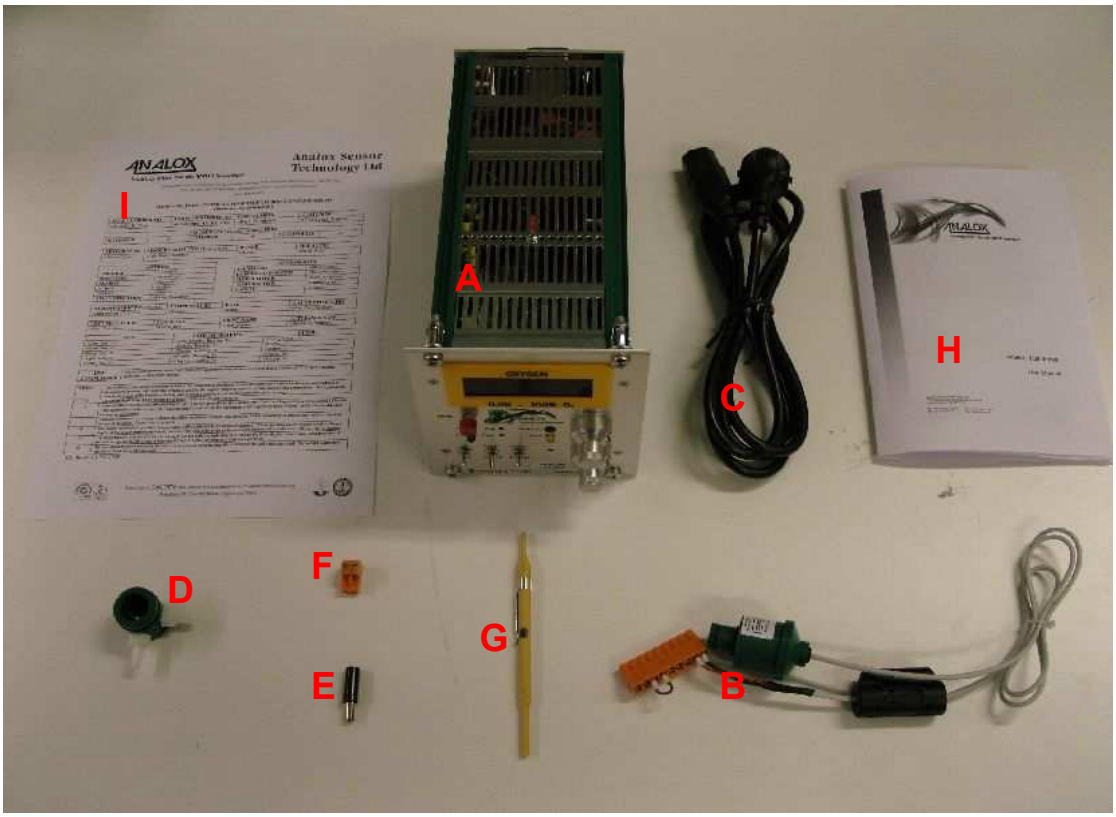
- Analox 1000 Series Range Electrical Specification 13
- Analox 1000 Series Mechanical Specification 14

Approvals 15

Disposal 16

ANALOX
looking after the air YOU breathe®

Package Contents Checklist



A) Analox 1000 O2 Monitor
B) 9212-2 Oxygen Sensor
C) IEC mains Lead
D) 2 Spigot Universal Flow Adaptor
E) 2.1mm DC Jack Socket
F) 2 Way Screw Terminal Socket Block
G) Trimming Tool
H) User Manual
I) Test Certificate

About the product

The Analox 1000 Series Oxygen (O2) provides continuous digital display of the measured parameter on a 4 ½ Digit red LED display and may be configured to read any value in the range 0000 – 19999, where a decimal point can be set in position between any two digits to allow the instrument to be configured for the particular version and scale of the instrument.

The following range of 1000 Series versions are available:

- 0.00 - 00.00% O2
- 0 – 2000 mBar pp O2

The Analox 1000 series is easy to use and no additional training is required to operate all versions due to a commonality of user functions.

In operation the instrument is easy to calibrate, using just a ‘ZERO’ and ‘CAL’ adjustments on the front panel of the instrument.
The Analox 1000 range has two user adjustable audio/visual alarms, configurable as HI/HI or HI/LO going (Factory set). Alarms are fitted as standard and these may be adjusted over the full range of the instrument. The audible alarm can then be silenced by pressing the ‘MUTE’ button.
The 1000 Series 100% O2 version also has a HI/LO resolution switch allowing the accuracy of the display to be switched between one and two decimal places (i.e. 100.0% O2 and 100.00% O2).

User Controls and I/O Connections

User Controls

Figure 1 below shows the user controls for the 1000 Series instrument on the front panel:

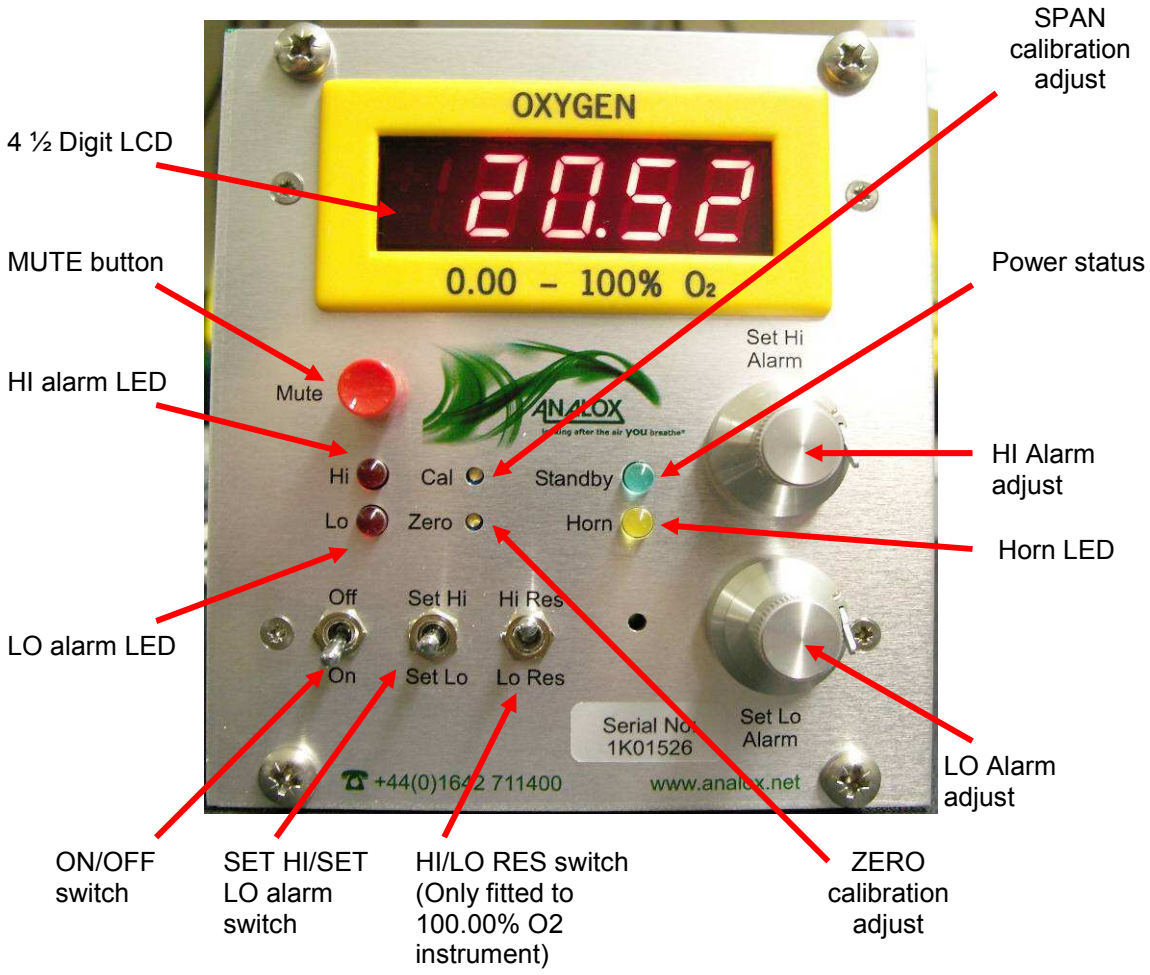


Figure 1

I/O Connections

Figure 2 below shows the I/O connection for the 1000 Series instrument on the rear panel:

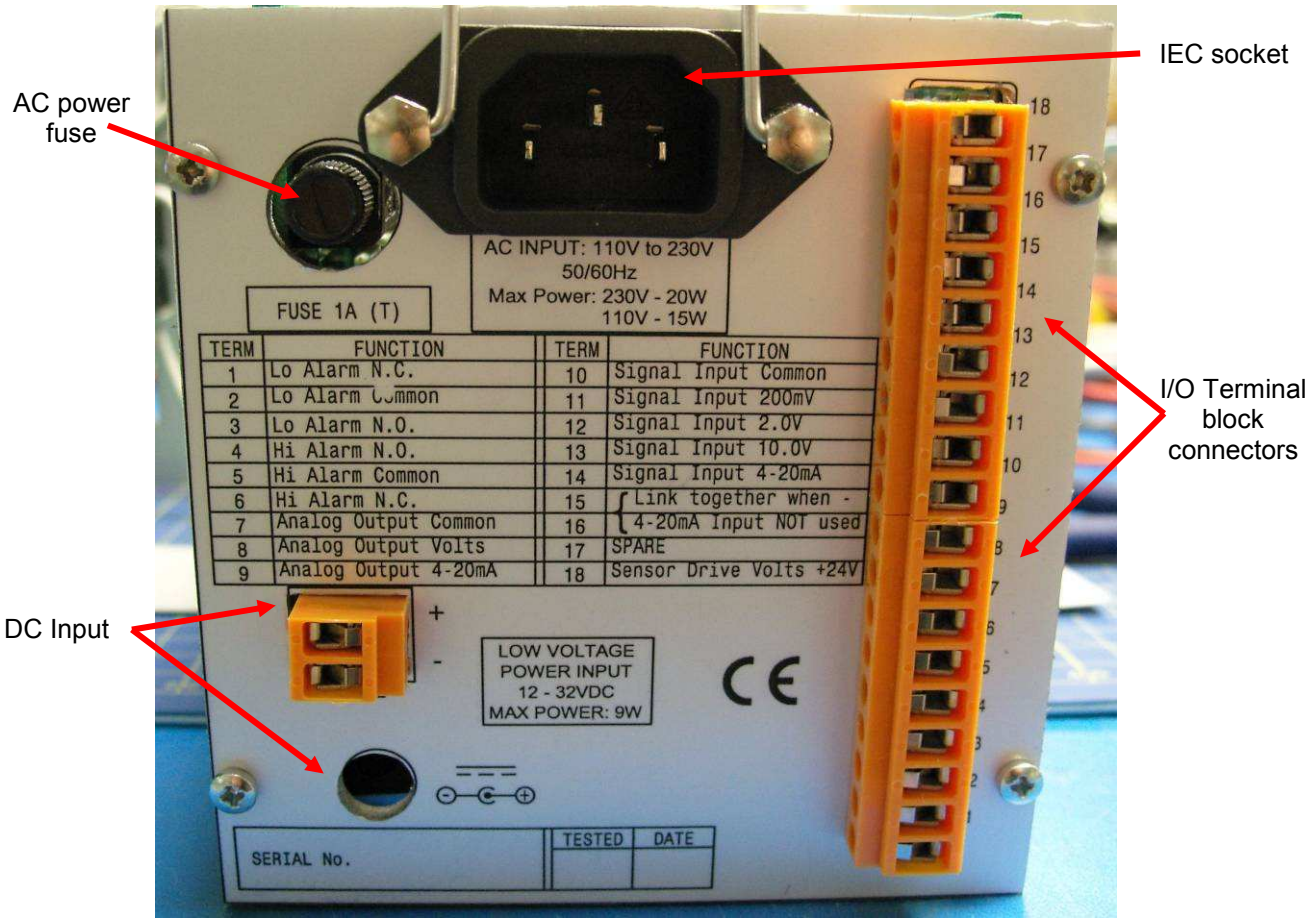
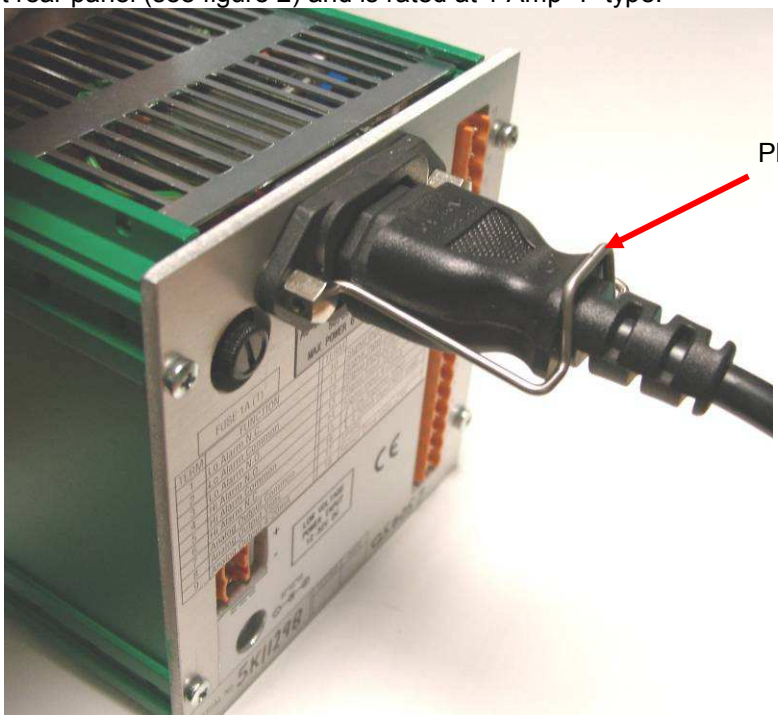


Figure 2

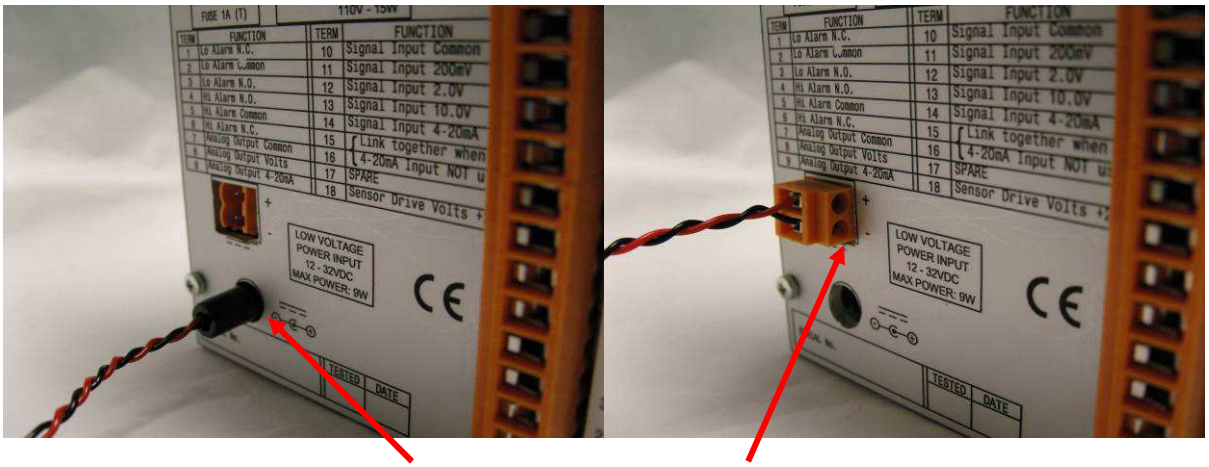
Power supply

Power for the instrument may be derived from 1 of 2 options:
NOTE: THIS EQUIPMENT MUST BE EARTHED

1 AC power in the range 85 to 264VAC, 47 to 63 Hz and connected via a standard IEC 3 pin plug/socket in the instrument rear panel (see figure 2). A suitable lead is supplied with the instrument. A plug clip is used to hold the IEC connector in place.
Note that NO voltage selection is required when using this input – the instrument will operate from any voltage within the stated range. The fuse for this AC power input is mounted in the instrument rear panel (see figure 2) and is rated at 1 Amp 'T' type.



2 Low voltage DC in the range 12 to 32 VDC with a ripple not exceeding 1 volt and connected via the battery charger type connector or the 2 way screw terminal type connector in the instrument rear panel (see figure 2). THE LOW VOLTAGE DC SUPPLY SHOULD BE EXTERNALLY FUSED at a rating of 1 Amp using a 'T' type delay fuse. Note the correct polarity when using the DC input.



Battery Back-up

An optional Battery Back-up option is available (factory fitted) that will power the instrument for approximately 1 hour in the event that the external power supply to the instrument fails. The instrument will automatically change over to the internal battery supply when the external power fails, no user intervention is required.
When the instrument is being driven by its internal battery the green 'STANDBY' LED on the front panel (see Figure 1) will be lit and will remain on until external power is restored.
When the battery has been discharged to such a level that instrument operation below this level would not be reliable, then a trip circuit will turn off the complete instrument and indicate this state by flashing the green 'STANDBY' LED at approximately 1 second intervals.

Alarm Setting and Operation

Before any adjustments are made to the 'HI/LO Alarm adjust' controls, the operator should release the locks on the knobs. This is done by moving the small lever located at the edge of the control until the knob turns freely. After adjustment, the locks should be reset in order to prevent accidental movement.
The 'SET HI'/'SET LO' toggle switch (see Figure 1) is normally biased to its central position to read the measured oxygen level. The high alarm trip point is set by moving this switch upward and adjusting the ''HI Alarm adjust' control knob until the desired high alarm trip level is displayed. The low alarm trip point is set by moving the switch downward and adjusting the ''LO Alarm adjust' control knob until the desired level is displayed. The alarm trip levels are adjustable over the full-scale range of the instrument.

If the operator only requires to check the current alarm set-points this may be done by just pressing the 'SET HI'/'SET LO' toggle switch to the appropriate position and the alarm set-point will be shown on the LED display.

NOTE: The mechanical locking action may move the set point very slightly and will result in the set point being moved slightly lower than the desired value. If necessary, this can be overcome by observing the error when locking the control and then resetting the adjustment to the desired point PLUS the error before locking.

E.g. If the desired setpoint is 23.00 and the observed error on locking is 0.03 then adjust the control to read 23.03 and on locking, the setpoint will be moved to 23.00.

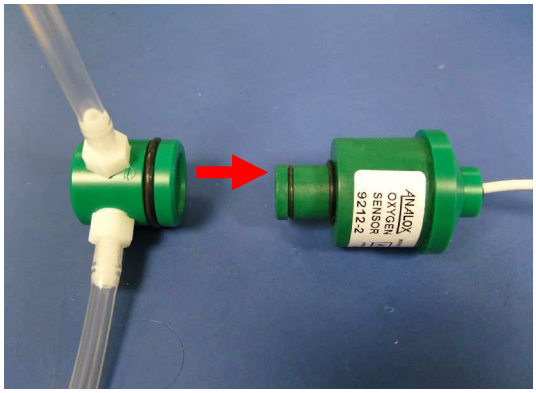
If an alarm condition occurs, the internal audible buzzer will sound intermittently and the yellow 'HORN' LED (see Figure 1) will flash, thereby identifying which instrument is causing the alarm. The appropriate red 'HI' or 'LO' LED (see Figure 1) will indicate the alarm level. The audible alarm can then be silenced by pressing the 'MUTE' button (see Figure 1); this action will also turn off the yellow 'HORN' LED. If the reading is still in an alarm condition, the red 'HI' or 'LO' LED will continue to flash until the parameter being measured returns to a non-alarm value. The red LED will then turn off. If an alarm condition occurs and the parameter being measured then returns to normal before the 'MUTE' button is pressed, then the audible and visual alarms will continue to be active until the 'MUTE' button is pressed. This facility allows the operator to be aware of any alarm occurrence whilst the instrument was unattended.

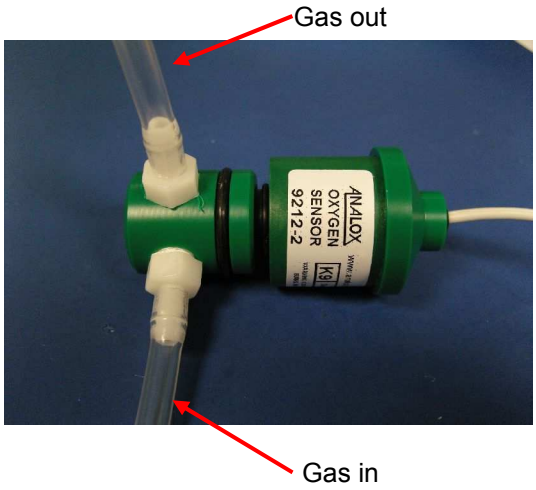
The alarms have a built-in hysteresis (The amount of this varies according to the full-scale of the instrument) to overcome 'nuisance' triggering when measuring near the set points. This means that if a high alarm occurs with a set point of 23%, then having been acknowledged by pressing the MUTE button, the alarm will not clear until the oxygen level drops below 22.96%.

ANALOX
looking after the air YOU breathe®

Calibration

To calibrate the Analox 1000 instrument the supplied calibration adaptor should be used with 6mmOD x 4mmID Flexible Polyurethane tubing to pass the calibration gas over the Oxygen sensor. The flow adaptor should be connected to the sensor as shown below:





ZERO Adjustment

The instrument sensor should be exposed to the appropriate 'ZERO' gas as shown in the table below:

Instrument version	Measurement Parameter	Range	Zero gas	Zero Display Adjust
1000	Oxygen	0.00-100.00%	Nitrogen	0.00
	Oxygen	0-2000mBar pp	Nitrogen	0

NOTE: During the zero calibration procedure the LO alarm may trip depending on the alarm set-point level.

The gas should be passed across at a flow rate of approximately 0.5 litre/min for a minimum of 3 minutes.

When the reading is steady, adjust the 'ZERO calibration adjust' (see Figure 1) control on the instrument front panel until the display reads the required value.

SPAN Adjustment

The instrument sensor should be exposed to the appropriate 'SPAN' gas as shown in the table below:

Instrument version	**Measurement Parameter**	**Range**	**Span**	**Span Display Adjust**
1000	Oxygen	0.00-100.00%	A known concentration of Oxygen*	Concentration value of gas
	Oxygen	0-2000mBar	A known concentration of Oxygen*	Concentration value of gas

* Expose the sensor to normal ambient atmosphere (i.e. typically 20.90% or 209 mBar pp) or use a known accurate oxygen concentration gas supply

NOTE: During the Span calibration procedure the HI alarm may trip depending on the alarm set-point level.

The gas should be passed across at a flow rate of approximately 0.5 litre/min for a minimum of 3 minutes.

When the reading is steady, adjust the ‘CAL calibration adjust’ (see Figure 1) control on the instrument front panel until the display reads the required value.

Installation

The Analox 1000 Series range are available in two forms:

1 Suitable for insertion in a 19 inch Rack Frame, occupying ¼ of a standard 3U Frame

2 Suitable for direct mounting in an existing instrument panel

For details of dimensions, cut-outs and mounting centres, refer to the Specifications on Page 14 of this handbook.

The frame mounting version should be inserted in a suitable rack and secured by the 4 corner screws and bushes supplied with the instrument.

When fitting the panel mounted version, the bushes should be left attached to the instrument, as supplied and the whole assembly inserted into the panel, easing the bushes into the 10mm holes. Tightening the 4 screws will expand the bushes, locking them into the panel. If the instrument is subsequently removed from the panel, it is only necessary to remove the screws – the bushes should remain captive in the panel.

ANALOX
looking after the air YOU breathe®

Signal Inputs and Outputs

All signal inputs and outputs are made to removable, screw terminal plugs. The main connector is located down the right side of the rear panel, when viewed form the rear (see figure 2).
The function of each terminal connection is indicated by the table, a copy shown below, on the rear panel (see figure 2).

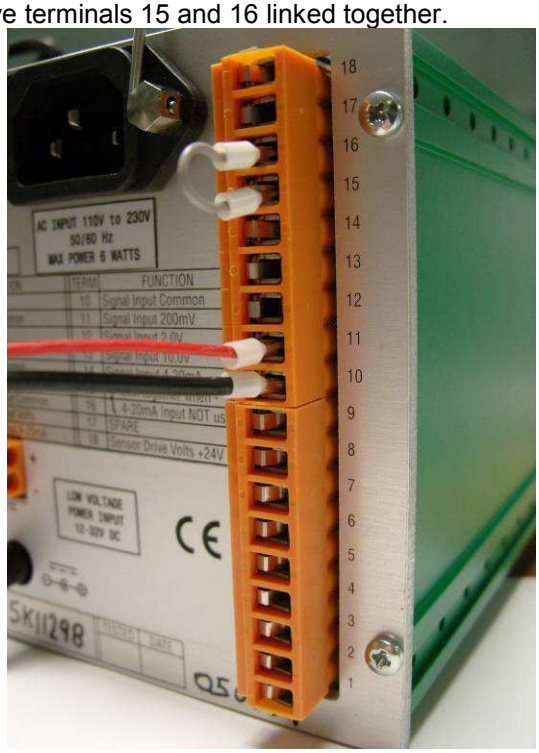
TERM	FUNCTION	TERM	FUNCTION
1	Lo Alarm N.C.	10	Signal Input Common
2	Lo Alarm Common	11	Signal Input 200mV
3	Lo Alarm N.O.	12	Signal Input 2.0V
4	Hi Alarm N.O.	13	Signal Input 10.0V
5	Hi Alarm Common	14	Signal Input 4-20mA
6	Hi Alarm N.C.	15	{ Link together when -
7	Analog Output Common	16	{ 4-20mA Input NOT used
8	Analog Output Volts	17	SPARE
9	Analog Output 4-20mA	18	Sensor Drive Volts +24V

Sensor connections

The Analox 1000 Series is designed to accept a Voltage input signal from the O2 sensor. Therefore, the sensor must be connected to the appropriate input terminals to ensure correct operation. The table below list the correct terminal connections for the range of sensors available within the Analox 1000 Series range:

Instrument version	Wire	Function	Terminal connection
1000	RED	Sensor Signal	11
	BLACK	Sensor Gnd	10

The instrument MUST have terminals 15 and 16 linked together.



Analogue Output

The Analox 1000 Series range provides 2 analogue output signals that are proportional to the displayed value of the instruments full scale:

Analogue Output	Terminal Function	Terminal Connection
4-20mA	Analogue Output Common	7
	Analogue Output 4-20mA	9
0-1V	Analogue Output Common	7
	Analogue Output Volts	8

The current output is powered from an internal nominal 24 volt supply and can operate into a load from 50 Ohms to 500 Ohms.
The voltage output should NOT be connected to a load less than 10,000 Ohms.

Relay Outputs

All instruments in the ANALOX 1000 range are fitted with two single pole change-over relays which operate in conjunction with the HI and LO alarms. The relays contact specification is as follows:

Contact Arrangement : 1 Form A , 1 Form C
Contact Rating : 10A 120V ac/24V dc (C)
15A 120V ac/24V dc (A)

Relay contact	Terminal connection
LO Alarm Normally Closed (N.C.)	1
LO Alarm Common (COM)	2
LO Alarm Normally Closed (N.O.)	3
HI Alarm Normally Closed (N.O.)	4
HI Alarm Common (COM)	5
HI Alarm Normally Closed (N.C.)	6

The relays may be configured to be energised or de-energised when the instrument is in a non-alarm state. If the relays are configured to be in a normally energised state, this will provide a ‘Fail-Safe’ facility in that a total power failure will cause the relays to release and signal an alarm condition. However, the extra power drawn by the relays being energised for most of the time will reduce the time for which the instrument will operate on ‘Battery Back-up’. Contact arrangement is shown on the rear panel. Instruments normally leave the factory with the relays configured to ENERGISE IN ALARM conditions.

ANALOX
looking after the air YOU breathe®

Specifications

Analox 1000 Series Range Electrical Specification

Power Supply Options:	85 to 264 VAC 47 to 63 Hz Without switching MAX POWER: 264V – 20Watts 85V – 15Watts 12v to 32v DC Max Ripple 1v MAX POWER: 6 Watts
Display:	4 ½ Digit red LED
Analogue Outputs:	0 – 1 Volt over FS range 4 – 20 mA over FS range
Alarms:	2 audio/visual alarms, configurable as HI/HI or HI/LO Alarms fully adjustable over FS range of instrument
Alarm Relay Outputs:	2 x Single Pole changeover 1 Form A , 1 Form C 10A 120V ac/24V dc (C) 15A 120V ac/24V dc (A) Configurable to be energised or De-energised when in Non-Alarm Condition
Optional Extras **Internal Battery Back-up**	5 Volt 1.4 AH Nickel Cadmium Backup time Approx 1 Hour minimum
Range:	0.00% - 100.00% at Atmospheric Pressure or 0mBar pp - 2000mBar pp
Accuracy:	Analox 9212-2 cell 0-100%: The greater of ±1% of reading or ±0.035%O2 at constant temperature and Pressure (CPT) C3 cell 0-100%: ±1% of FS at CTP B1 cell 0-25%: ±1% of FS at CTP 0-100%: ±5.5% of FS at CTP Paramagnetic Sensor 0-100%: ±0.1% of FS at CTP All accuracies assume regular calibration (e.g. at start of each 8 hour operating period).
Temperature Effect:	+/- 0.1% of Readout per ˚C

Analox 1000 Series Mechanical Specification

Dimensions:

Rack Mounted Version

Depth:	Overall 245mm
Height:	Overall 129mm
Width:	Overall 107mm
Weight:	2 Kgs

Panel Mounted Version

Depth:	Overall 245mm
Height:	Overall 133mm
Width:	Overall 120mm
Weight:	2 Kgs

Panel cut-out Aperture

Height:	112mm
Width:	102mm

Mounting Centres

Holes:	4 x 10mm
Height:	122.5mm
Width:	91.4mm
Centred:	on cut-out

Environmental

Operating Temp:	0-60oC
Storage Temp:	–40 to +85oC
Relative Humidity:	95% at 40oC Non. Condensing

Approvals

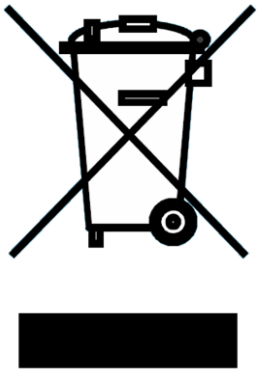
Conforms to all applicable requirements of:

- EN 61000-6-3:2007
- EN 50270:2006
- EN 61010-1: 2001

This product complies with the requirements of the **Electromagnetic Compatibility (EMC) Directive 2004/108/EC**

This product complies with the requirements of the **Low Voltage Directive (LVD) - Directive 2006/95/EC**

Disposal



According to WEEE regulation this electronic product can not be placed in household waste bins.
Please check local regulations for information on the disposal of electronic products in your area.